XLII.—*On the History of* Echeneis. By Dr. Albert Günther.

[With a Plate.]

There is scarcely a fish of the existence of which the ancients have been equally certain, and which has so much occupied their imagination—from a power thought to be inherent in the creature to counteract the strongest physical agencies—as the *Echeneis* of the Greeks or the *Remora* of the Latins. There is scarcely a genus of fish which, from the time of its foundation by Artedi, has been considered more natural, or more completely left in its integrity, than *Echeneis*. And, finally, there is scarcely a group of fishes which, although spoken of in nearly every voyage or account of marine fishes, has been so little *comparatively* treated, and which has experienced a similar splitting up into nominal species.

I. *History of the Fish from Aristotle to Artedi.*

We find the first mention of the name of the fish in Aristotle's 'History of Animals*.' The shortness of the notice, however, and the notice itself, afford ample proof that he did not know the fish, and that he has applied the name of *Echeneis* to a Blenny†. He never could have omitted to give a description of such a peculiar organ as the suctorial disk of *Echeneis*. He describes the fish as inhabiting rocky parts of the sea, and as having fins (pectorals and ventrals) somewhat similar to feet. This does not apply to *Echeneis*, but clearly refers to *Blennius*, a genus the species of which use their fins like feet for locomotion along the vertical and horizontal surfaces of the rocks which they inhabit. Aristotle, however, and Ælian mention another fish, called *φθεὶρ, the louse*:—"In the sea between Cyrene and Egypt there is a fish about the Dolphin (*Delphinus*), which they call the Louse; this becomes the fattest of all fishes, because it partakes of the plentiful supply of food captured by the Dolphin." (Aristot. Hist. E. κε. 3; Ælian, ix. 7.) Schneider and Lowe are perfectly right in suggesting that this fish is the *Echeneis* of more modern writers. (Lowe, *l. c.* p. 78.) The commentator on Aristotle, Theodore Gaza, adds to this original note merely the etymological explanation of the name *Echeneis* as he found it in other ancient writers, namely its derivation from ἔχειν and ναῦς.

It is not quite clear whether the opinion that the Remora

* Aristot. Hist. Anim. ii. c. 9. Ἔστι δ' ἰχθύδιόν τι τῶν πεταίων, ὃ καλοῦσί τινες ἐχενηΐδα, καὶ χρῶνταί τινες αὐτῷ πρὸς δίκας καὶ φίλτρα· ἔστι δὲ ἄβρωτον. τοῦτο δ' ἔνιοί φασιν ἔχειν πόδας οὐκ ἔχον, ἀλλὰ φαίνεται διὰ τὸ τὰς πτέρυγας ὁμοίας ἔχειν ποσίν.

† See Lowe, 'Fishes of Madeira,' p. 78.

had the power of arresting vessels in their course existed at the time of Aristotle, and that he merely omitted the mention of it as very improbable, or whether it was developed at a later period. It was, at all events, a general belief in the first century P. C. We find the first mention of it in Ovid, Halieut. v. 99:

> Parva Echeneis adest, mirum, mora puppibus ingens.

Pliny devotes to it that well-known passage, lib. xxxii. cap. 1, which I need not repeat here, as it is quoted in full by Lacépède and Shaw; he brings forward two historical proofs for the fact, which consequently none of his successors dared to deny. He himself had never seen the fish; and the indistinctness of his description* wherein he compares it (from the account of the party in Caligula's vessel) with the slimy body of a *Limax*, and its mysterious powers with those of the *Concha venerea*, has led several later writers into an odd confusion of it with some Mollusk.

Oppian† and his copyist Ælian‡ are the only writers of the

* Hist. Anim. ix. c. 25 (copied from Aristotle, xxxii. c. 1).

† Halieut. i. p. 9. Oppian describes no less beautifully than Pliny this mystery of ancient zoology; and not finding the passage quoted by other writers, I may be allowed to give it here:—

καὶ μὲν δὴ πελάγεσσιν ὁμῶς ἐχενηὶς ἑταίρη·
ἡ δ' ἤτοι ταναὴ μὲν ἰδεῖν, μῆκος δ' ἰσόπηχυς,
χροιὴ δ' αἰθαλόεσσα, φυὴ δέ οἱ ἐγχελύεσσιν
εἴδεται, ὀξὺ δέ οἱ κεφαλῆς στόμα νέρθε νένευκε
καμπύλον, ἀγκίστρου περιηγέος εἴκελον αἰχμῇ.
θαῦμα δ' ὀλισθηρῆς ἐχενηΐδος ἐφράσσαντο
ναυτίλοι, οὐ μὲν δή τις ἐνὶ φρεσὶ πιστώσαντο
εἰσαΐων, αἰεὶ μὲν ἀπειρήτων νόος ἀνδρῶν
δύσμαχος, οὐδὲ θέλουσι καὶ ἀτρεκέεσσι πιθέσθαι.
νῆα τιταινομένην ἀνέμου ζαχρηέος ὁρμῇ,
λαίφεσι πεπταμένοισιν ἁλὸς διὰ μέτρα θίουσαν,
ἰχθὺς ἀμφιχανὼν ὀλίγον στόμα νέρθεν, ἐρύκει
πᾶσαν ὑποτρόπιος βεβιημένος, οὐδ' ἔτι τέμνει
κῦμα καὶ ἰεμένη, κατὰ δ' ἔμπεδον ἐστήρικται,
ἠΰτ' ἐν ἀκλύστοισιν ἐεργομένη λιμένεσσι.
καὶ τῆς μὲν λίνα πάντα περὶ προτόνοισι μέμυκε
ῥοχθεῦσιν δὲ κάλωες, ἐπημύει δὲ κεραίη.
ῥιπῇ ἐπειγομένη, πρύμνῃ δ' ἔπι πάντα χαλινὰ
ἰθυντὴρ ἀνίησιν ἐπισπέρχων ὁδὸν ἅλμης.
ἡ δ' οὔτ' οἰήκων ἐμπάζεται, οὔτ' ἀνέμοισι
πείθεται, οὐ ῥοθίοισιν ἐλαύνεται, ἀλλὰ παγεῖσα
μίμνει τ' οὐκ ἐθέλουσα, καὶ ἐσυμένη πεπέδηται,
ἰχθύος οὐτιδανοῖο κατὰ στόμα ῥιζωθεῖσα.
ναῦται δὲ τρομέουσιν, ἀείδελα δεσμὰ θαλάσσης
δερκόμενοι, καὶ θάμβος ἴσον λεύσσοντες ὀνείρῳ.

Oppian, Halieut. p. 9. v. 212–236.

‡ De Animal. Natura, i. c. 36; ii. c. 17.

second century who mention the fish, and agree with each other in the principal points of its general form and qualities. Although the organ of adhesion was unknown to them, they were better informed than Pliny, describing the fish as brown, 1 foot long, eel-like, with the mouth directed upwards. Oppian, however, imagines the lower jaw to be formed in the shape of a hook, by which the fish stops a vessel.

Wotton (de Differentiis Animalium, p. 149) gives a short abstract of what earlier writers have stated.

Whilst the nature of the fish remained entirely unknown to Bellonius (*Echeneis* s. *Remora*, p. 440), Rondelet appears to have had a far more correct idea of it, and he endeavours to give a natural explanation of the powers attributed to the fish. He devotes a long chapter to it (lib. xv. c. 18. p. 436). We find that the fish was called in Latin not only *Remora* (quia remoratur naves), but also *Remilegium*; in Greek *Echeneis* and *Naucrates*, *παρὰ τὸ ἔχειν καὶ κρατεῖν τὴν ναῦν*. He clearly recognizes the discrepancies in the accounts of the different authors, and distinguishes (1) the fish of Aristotle; (2) those accounts from which the *Remora* would appear to be a snail-like animal; and (3) the fish of Oppian. Referring to Aristotle, he maintains that the *Remora* is a true fish; but, not knowing it by autopsy, he comes to the conclusion, from Oppian's account (and not without reason), that it is a kind of *Petromyzon**, a form which was well known to him. He does not maintain the assertion of the fish's power of completely stopping a vessel, but states that, after a long voyage, a vessel is covered with marine growths, its bottom becoming soaked through, and therefore it is incapable of cutting through the water with the same facility as at first. The *Remora* likes to attach itself to such vessels; and although it is not the original cause of the slower course of the ship, it is probable that the continual lateral movements of its body are gradually communicated to the vessel itself, which then considerably slackens in speed.

Aldrovandi (iii. cap. 22. p. 335) copies Rondelet in the principal points, but prefers to return to the ancient opinion of a mysterious power inherent in the fish. He gives, however, so accurate a figure of *Echeneis naucrates*, that the general external characters of the genus appear to be fixed from the year 1649.

Gesner (De Aquat. p. 410) and Jonston (Thaumatogr. lib. i. tit. i. cap. 2. art. 4. tab. 4. fig. 3) reproduce the accounts of the earlier writers, without contributing anything new to the knowledge of our fish; the latter, however, gives a rough figure, apparently taken from *Echeneis naucrates*. It is this species also, in all probability, which we find figured by Marcgrave

* Cf. Artedi, Synon. p. 90.

(Iter, p. 180); he observed the fish in the tropical parts of the Atlantic, and, without alluding to its supernatural powers, he adds, as a new fact to its history, that it adheres not only to vessels, but to other large fishes: "*Tiburoni* (Zygæna malleus) *firmiter hæret in ventre.*" Nieuhoff* says the same, very distinctly representing *Echeneis remora*, to which he applies the Dutch name of *Zuiger*. Dampier†, an accomplished sailor, was well acquainted with the "Sucking-fish," and gives a true account of its habits when accompanying a vessel. He represents the fish as being of the size of a large Whiting, and describes the "excrescence on the head of a flat oval form, about 7 or 8 inches long and 5 or 6 broad, and rising about half an inch high." This would indicate that *E. albescens* or *clypeata*, to which these statements and the figure (Voy. to New Holland, i. tab. 1. fig. 6) may be applied, grow to a length of 2 feet!

An original figure, which has been copied by several authors, is to be found in Olearius (Gottorffschen Kunst-Kammer, tab. 25. f. 2). It will be difficult to decide whether it has been taken from *E. remora* or *naucrates*, as it represents the number of laminæ of the former species, and the slender form of the body of the latter.

The figure and the account of Marcgrave have been copied by Willughby (p. 119. tab. G. 8. f. 2), by Ray (p. 71), and by Jonston (*l. c.* tab. 39. f. 8). Ruysch again reproduces both the figures from Jonston's work (Theatr. Univers. p. 7, tab. 4. f. 3, tab. 39. f. 8), and adds a third, and very bad one, in the Pisc. Amboin. p. 13. No. 13 (Coupang-Visch), tab. 7. f. 13.

II. *Foundation of the Genus, and its place in the System.*

The father of ichthyology, Artedi, recognized in the *Echeneis* of the Greeks the type of a peculiar genus, to which he gave that name, and which he characterized by "caput plagioplateum, superne striis transversis asperis notatum." (Genera, p. 14.) Finding, however, a single dorsal fin only, without spinous rays, he placed the genus in the *Malacopterygii*. All subsequent systematists and writers, from Linnæus down to Cuvier, have left its characters and its position unaltered. Voigt (System der Natur, pp. 482, 835) first directed attention to the buckler of the head being a modified dorsal fin: he pronounces it to be a fin the rays of which have been bent downwards on both sides; they are provided with small hooks, which have the same function as in several species of *Balistes*.

After Voigt, Blainville comes to the same conclusion; but both leave the fish among the *Malacopterygii*, and it was left to

* Bras. Zee- en Lant-Reize, ii. p. 274. f. 67.

† Voyage round the World, i. p. 64.

Agassiz and Joh. Müller to remove it from that order. Agassiz*, although he does not mention either Voigt or Blainville, explains the nature of the disk exactly in the same manner, and places the genus in the family of Scombridæ. Müller† also does not appear to have been acquainted with the opinion of Voigt, and draws his conclusion merely from the structure and the insertion of the ventral fins, so widely different from those in the *Malacopterygii jugulares*: he establishes for the genus a separate group (Echeneidæ) in the family of Gobioidei. The close affinity of *Echeneis* with *Elacate* was first recognized by Holbrook‡; and if *Echeneis* be placed among the Scombridæ or Gobioidei, *Elacate* must follow.

III. *Discrimination of the Species.*

The progress of our knowledge of the different species will be more easily surveyed if we divide the account according to the species themselves. Although, as we have seen, the two most common species were known to ante-Linnæan authors, they were confounded together; and even Willughby and Artedi believed that there was one species only. Linnæus (Syst. Nat. i. p. 446 §) first distinguished *Echeneis remora* and *Echeneis naucrates*, characterizing the one as "E. cauda bifurca, striis capitis octodecim," and the other as "E. cauda integra, striis capitis viginti quatuor,"—diagnoses by which later ichthyologists were led into great errors, the form of the caudal fin being considered as a constant specific character.

1. *Echeneis remora.*

We shall not commit any great error if we refer to this species, which is the most common in the Mediterranean, the more or less philosophical accounts of Ovid, Pliny, Plutarch‖, Ælian, Oppian, Wotton, and Rondelet. The first rough figures which without any doubt represent the present species, were given by Nieuhoff, *l. c.*, and four years afterwards by Willughby, with the name of *Remora Imperati* (Appendix, p. 5, tab. 9. f. 2),—the figures of Valentyn (iii. f. 32, p. 357. n. 32) and Renard (i. tab. 1. f. 3) being very bad, and scarcely distinguishable.

Klein and Gronovius distinguish the same species as Linnæus. Whilst the former indicates several varieties of the large Indian

* Recherch. Poiss. Foss. v. p. 117 (tab. G represents the skeleton of *E. naucrates*).

† Berlin. Abhandl. 1844, pp. 158, 159.

‡ Ichthyol. South Carol. p. 104.

§ And in Amœn. Acad. i. p. 320; Mus. Reg. Ad. Frid. i. p. 75.

‖ Sympos. lib. ii. and in Vita Antonii.

species, the latter creates two different species of the smaller one*. They consider *E. remora* as being confined to the European seas. Klein (Miss. Pisc. p. 51. no. 1) describes it as "Echeneis cœrulescens, ore retuso." Gronow gives a better and more detailed description in Zoophyl. p. 75. no. 256, and in Mus. Ichthyol. i. no. 33. It would appear, from his 'System,' p. 92, that he also knew the white variety, for which he creates the name of *Echeneis parva,* identifying it, however, with *E. remora,* Linn. He received his specimen from America.

Edwards knew nothing of the nature of the fish; he believed that "it feeds on the slimy substance it finds on the skins of the greater fishes" (Gleanings, no. 210); the rough drawing in Petiver's Gazophyl. tab. 44. f. 12, is worse than any of those already referred to.

The species appears to be only an occasional visitor to the English coasts. Pennant† enumerates it for the first time among the British fishes; Turton‡ took a specimen himself from the back of a cod-fish; and Sir J. Richardson § mentions another instance of its being found on the gills of a shark (*Carcharias glaucus*).

Duhamel || gives a good description, but a miserable figure, the sucker looking more like the shell of a *Pecten.* He attributes the adhesion of the sucker to the minute spines, which, entering a body, offer considerable resistance in the direction towards the tail, but none whatever in that towards the head.

Otto Frederic Müller enumerates the fish in the 'Prodromus Faunæ Danicæ' (no. 361); but it is evidently an accidental visitor to those coasts¶.

Two accurate observers, however, attest its occurrence in still higher latitudes, namely in Iceland: Olafsen (Reise durch Island, ii. p. 207), and Faber (Fische Islands, p. 115) (Styris-fiskr).

Of the occurrence of the fish on the coasts of North America we find the first accurate notice in the true and elaborate account of Schœpf**, who at the same time explains the fact of its being spread all over the globe, saying that he saw the fish taken from several vessels newly arrived at New York. Mitchill†† also knew the fish well, and declares a specimen taken at New York to be identical with those from the Mediterranean; whilst

* System. Ichthyol. ed. Gray, p. 92.

† Pennant, Brit. Zool. edit. 10. vol. iii. App. p. 524.

‡ Turton, Brit. Faun. p. 94.

§ Yarrell, Brit. Fish. edit. 3. vol. i. p. 671.

|| Pêches, ii. sect. 4. p. 56, pl. 4. f. 5.

¶ I find a reference also to Osbeck, 'Voyage to China,' p. 94,—a work not accessible to me.

** Schrift. Gesellsch. naturf. Freunde Berlin, viii. 3. p. 145.

†† Trans. Lit. and Phil. Soc. New York, i. p. 378.

Richardson*, at the time of the publication of the 'Fauna Borealis,' could not yet believe in the existence of the same species on both sides of the Atlantic. Dekay has borrowed his knowledge of the fish from the authorities mentioned, and enumerates it in his valueless work on the fishes of New York (p. 309).

The occurrence of the species in the Japanese seas has been asserted by Schlegel (Faun. Japon. p. 271), and in the East Indian Archipelago by Bleeker. (*E. remoroides*).

The accounts given by Bloch† deserve particular attention, because he describes a variation in the number of lamellæ in the sucker (16–20), and maintains the occurrence of the same species in the Mediterranean, the Atlantic, and the Pacific. But he continues to regard the lunate form of the caudal fin as characteristic of the species. The description given by Lacépède‡ is more detailed and correct in nearly every respect, he having used the manuscripts of Commerson as his chief authority. After quoting and criticising the ancient accounts of Pliny, he proceeds to relate the observations of Commerson on the habits of the fish. He explains the brown coloration of the lower parts by the circumstance of its being frequently fixed to other swimming bodies with the belly directed upwards and exposed to the light. He even goes so far as to say that the fish, if not attached to another body, is not able to swim on the belly, but that it is compelled to swim always on the back. This observation, however, has not been confirmed by others; and it is probable that it did not originate with Commerson, but was interpolated by Lacépède, who was then anxious to find an additional proof for his theory that those parts of a fish which are exposed to the light show a greater intensity of colour than the others. Sir J. Richardson (*l. c.*) describes its movements as a swimming with a wriggling motion like an eel, and with considerable velocity, so as to overtake with ease a vessel going before a brisk gale; and Bennett§ says that it propels itself by rapid lateral movements of the tail, attended with an awkward twirling motion. Commerson and Lacépède find the use of the sucker merely in the mechanical adhesion effected by the minute spines, by which the fish is enabled to repose, and nevertheless to accompany vessels, sharks, &c., from and with which it expects to find its food. Commerson also knew the white variety mentioned by Gronow; and Lacépède describes twelve abdominal and fifteen caudal vertebræ. The

* Faun. Bor. Amer. p. 265.
† Ausländ. Fische, ii. p. 134, pl. 172; and edit. Schneider, p. 240.
‡ Hist. Nat. Poiss. iii. pp. 146, 147, pl. 9. f. 1.
§ F. D. Bennett, Whaling Voyage, p. 271.

latter author has been extensively copied by Shaw (Zool. iv. p. 202, pl. 31), and he too gives an English translation of the passage in Pliny. The drawings accompanying all these accounts were more or less rough and imperfect; and it is Blumenbach's and Rosenthal's merit to have given for the first time figures which may be called scientific representations of the fish and of its skeleton (Abbildungen, taf. 78, and Rosenth. Ichthyotom. Tafeln, taf. 20. figs. 1–8).

Risso adds nothing to our knowledge of the habits * of the fish, but, in the 'Histoire Naturelle de l'Europe Méridionale' (iii. p. 270) he describes a remarkable variety, or even species, from the Mediterranean, with a sucker composed of twenty laminæ,—a number which I have never met with. He separates this fish from the *E. remora*, L., and applies to it the name of *E. naucrates*; it is, however, evident that Risso did not know the true *E. naucrates*; and his fish must be closely allied to *E. remora*, having twenty-two rays in the dorsal and anal fins. I have mentioned above, that Bloch also admits that the laminæ vary from sixteen to twenty in *E. remora*.

An attempt to distinguish new specific forms from the Linnæan *E. remora* has been made by Lowe †. He found that the lunate caudal was not a character common to all specimens, and that, moreover, in some the tongue was covered with asperities, and in others smooth. He called those with a truncated caudal *Echeneis jacobæa*, and those with a rough tongue *Echeneis pallida*, considering the specimens with lunate caudal and smooth tongue as *E. remora*, L. Having had apparently but few specimens for examination, he was induced to use differences in the number of the laminæ of the sucker as additional specific characters. But the difference between the extreme forms of the caudal fin is not great: every possible degree of emargination between those extremes may be observed; the most deeply notched caudal and the most truncated one do not correspond with a certain number of laminæ; the caudal, in fact, never has a posterior margin which forms a straight vertical line; and, finally, the same fin undergoes, with age, the greatest changes possible in *E. naucrates*, as we shall see afterwards. The structure of the surface of the tongue has no more specific value than the form of the caudal. Specimens with distinct asperities on the tongue are comparatively scarce; this character is merely

* He describes them in rather general terms, and it may be interesting to quote his own words: "Plus inertes qu'entreprenants, ils n'ont que des désirs modérés; plus indolents que courageux, ils se fixent sur les quilles, ou autour des bâtimens, et traînent ainsi une vie langoureuse et misérable." *E. remora*, Risso, Ichth. Nice, p. 177, and Eur. Mérid. iii. p. 269. *E. naucrates*, Risso, Eur. Mérid. iii. p. 270.

† Proc. Zool. Soc. 1839, p. 89.

indicated in others. Lowe says that it is found in specimens with nineteen laminæ in the sucker; those four in which I have found the larger portion of the tongue rough have seventeen and eighteen laminæ, and are, in other respects, entirely congruent with true smooth-tongued specimens of *E. remora*.

Dr. Bleeker* says that he had never seen the *E. remora* of the European ichthyologists. Unfortunately he used Yarrell's description for determining the species; but if he had had more opportunity of examining the descriptions of that naturalist, he would have seen that they are more of a popular character than specimens of scientific originality. Thus it happened that Dr. Bleeker examined the true *E. remora*, but described it as a different species (*E. remoroides*), deceived by some discrepancies which exist in his and Yarrell's descriptions, but not in nature. Yarrell, for instance, says that there are "two bands of minute teeth in the lower jaw, and a single band in the upper," whilst, in fact, both jaws are armed with a single band, that of the upper jaw being, however, narrower than the other. Now Yarrell frequently confounds a series of teeth with a band of teeth; and it is to be supposed that in the present case he intended to say that the teeth in the lower jaw form two series, and those in the upper a single one. Although even this is incorrect, the arrangement of the teeth may appear so to a superficial observer. This error has not been corrected in the third edition of Yarrell's work.

Finally, A. Murray separates a specimen with seventeen laminæ (a variation known long before) as a distinct species—*E. tropica* (Edinb. New Philos. Journ. 1856, iv. p. 287); the name itself has been preoccupied by Euphrasen for a different species. Murray also distinguishes between the action of the lining membrane of the sucker and that of the toothed lamellæ: "The sucker is quite sufficient for the mere purposes of adhesion, and may be probably used without the teeth or plates, when the Remora fixes itself upon rocks or stationary objects; but the plates and teeth are required to enable it to fix itself upon bodies in rapid motion." I infer, from the whole structure of the sucker, that such a separate action is not probable; the teeth, indeed, would be useless in an attempt of the Sucking-fish to attach itself to a "rock"; but there is no evidence of any one ever having seen the fish doing this.

I conclude this historical account of our first species with some remarks made by Bennett†, who had ample opportunities of observing the fish in nature, and who indicates what I think is the most natural cause of the firm adhesion of the

* Natuurk. Tydschr. Nederl. Ind. 1855, vi. p. 70.

† F. D. Bennett, Narrative of a Whaling Voyage, p. 271.

buckler, namely a vacuum effected by the laminæ, which can be erected either by the muscles during life, or artificially, after death, by impressing the spines into any body, the minute spines merely affording an additional help. "The use it makes of its sucker is much less than may be supposed: it often merely swims around the body it attends, and only fixes upon it occasionally, and for a very short time. The adhesion of the buckler is chiefly effected by the smooth membrane that margins it. After the death of the fish, and even after the head has been severed from the body, the moist membranous border of this organ adheres to a plane surface with undiminished power. One muscle can be raised and depressed by the fish, independent of the others, or all can be moved simultaneously and rapidly. Their uses are, to fix the sucker more firmly, to offer resistance in one determinate direction, and probably to liberate the sucker from its attachment by relieving the vacuum." Bennett saw "some perfectly white *Remoræ*."

2. *Echeneis naucrates.*

Although less frequent round the European coasts than *E. remora*, this species was described and figured at an earlier period and more correctly. We find it in the works of Aldrovandi *, Jonston †, Marcgrave ‡, Willughby §, Ray ‖, Ruysch ¶, Seba **. Consequently its occurrence in the Mediterranean and in the Atlantic was known almost from the first. Whilst Dutertre ††, Brown ‡‡, and Parra §§, mention its frequent occurrence in the Caribbean Sea, its presence in the Indian Ocean is indicated by Leguat ‖‖, and in the Mediterranean by Forskål ¶¶ and Hasselquist ***. The latter gives a most accurate description of it.

After being introduced into the system as *Echeneis naucrates* by Linnæus (Syst. i. p. 446), it is found in the works of Gronow †††, Klein ‡‡‡, Bloch §§§, and Lacépède ‖‖‖, who, following Linnæus,

* iii. cap. 22. p. 335.
† Thaumatogr. lib. i. tit. 1. cap. 2. art. 4, tab. 4. f. 3, tab. 39. f. 8.
‡ Marcgr. Iter, p. 180. § Will. p. 119, tab. G. 8. f. 2.
‖ Ray, p. 71. ¶ Theatr. Univ. p. 7, tab. 4. f. 3, tab. 39. f. 8.
** iii. p. 103, tab. 33. f. 2.
†† Hist. Génér. des Antilles, ii. pp. 209, 222 (fig.).
‡‡ Hist. Jamaica, p. 443. §§ Pegador, Parra, p. 94, pl. 36. f. 2.
‖‖ Voyage, p. 122 (fig. bad). ¶¶ Forskål, p. xiv (*Echeneis naucrates*).
*** Iter Palæst. p. 324, or, in the German edition, p. 371 (*Echeneis naucrates*).
††† Echeneis, sp. Gronov. Zoophyl. p. 75. no. 252, and Mus. Ichthyol. i. p. 13. no. 34, and Syst. ed. Gray, p. 92 (*Echeneis fusca*).
‡‡‡ Miss. Pisc. iv. p. 51. n. 2 (*Echeneis Willughbeii*).
§§§ Bloch, Ausländ. Fische, ii. p. 131, tab. 171 (coloration incorrect), and Bl. Schn. p. 239.
‖‖‖ Lacép. iii. pp. 146, 162, pl. 9. f. 2.

distinguish it specifically by the same incorrect character from *E. remora*, viz. "cauda integra." The description given by Lacépède is of special value, as in this species also he had the advantage of using the manuscripts of Commerson, who made detailed observations on the living fish. He says that the number of the laminæ of the buckler varies between twenty-two and twenty-six; but he considers the vertical or rounded margin of the caudal fin as a constant character. An account of a rather singular manner of catching sleeping turtles by means of a sucking-fish, held by a ring fastened round its tail, appears to have originated rather from an experiment than from a regular sport. The story is copied by Shaw *.

Russell (Fishes of Coromandel, i. p. 39, pl. 49) figures a specimen with twenty-five laminæ, under the name of *Ala Mottah*, given by the natives to the fish. I do not know whether this variety is identical with a fish described by M. Liénard in the 'Quatrième Rapport Annuel sur les Travaux de la Société d'Histoire Naturelle de l'Ile Maurice' (a work not accessible to me), and shortly mentioned in Proc. Zool. Soc. 1835, p. 205, or whether the latter is a truly different species.

The first attempt to separate specifically some forms very similar to *E. naucrates* was made by Mitchill. Schœpf †, Storer ‡, and Mitchill himself § had been of opinion that the larger species of Sucking-fish on the North American coast was identical with *E. naucrates*; and Richardson || mentions its occurrence even as far northwards as the coast of Newfoundland, where it had been found by Audubon. At a later period, however, Mitchill ¶ was struck by the white margin of the fins, which is more or less conspicuous in all specimens, especially in those of younger age; he named this imaginary species *Echeneis albicauda*, which name, as is quite clear, was originally not intended for the fish afterwards described by Holbrook as *E. lineata*, but merely for specimens of *E. naucrates* with a marked white margin to the fins. We cannot expect to find the question of the existence of a second large species in the Atlantic settled by Dekay. He ** adopts for the species found at New York the name of *E. albicauda*, adding that he had never seen *E. naucrates*; he repeats from Mitchill that its principal character is the white margin of the fins; his statement, that the number of laminæ

* Zool. iv. p. 209, pl. 31 (half-grown specimen).
† Schriften der Gesellschaft naturforsch. Freunde zu Berlin, viii. p. 145.
‡ Report Fishes Massach. p. 153.
§ Lit. and Phil. Trans. New York, i. p. 377.
|| Faun. Bor. Amer. iii. p. 266.
¶ Amer. Month. Magaz. ii. p. 244.
** New York Fauna: Fishes, pp. 307, 308, pl. 54. f. 117.

varies between twenty-one and twenty-three, proves that in fact he has confounded *E. naucrates* and *E. lineata*, Holbr. He informs his readers that all the species are natives of the tropical seas, and that they are to be considered only as accidental visitors to the coast of New York; and, a few lines further on, states that the species is not uncommon on the coast of Long Island. He mentions an instance of a specimen having ascended a considerable distance up the Hudson River. Those species which have been established on differences in the number of caudal and dorsal rays, or differences in the form of the caudal fin from that observed by Linnæus and subsequent ichthyologists in *E. naucrates*, appear to rest on a far more solid foundation. The variations, indeed, are great; and only an examination of a great number of specimens of different ages can lead us to a correct opinion on the subject.

1. We find, then, that the number of laminæ varies between twenty-two and twenty-five. Specimens with twenty-one or twenty-six laminæ are of rare occurrence. The number of dorsal rays varies between thirty-three and forty-one; that of the anal rays between thirty-two and thirty-eight. All the specimens in which these variations have been ascertained are otherwise exactly similar to one another, and especially show the same relative proportions of the different parts.

2. The caudal fin undergoes extraordinary alterations with age. In *young specimens* about 4 inches in length, *the middle portion of the fin is produced into a long filiform lobe.* This lobe gradually becomes shorter, and the fin shows a rounded margin in fishes of middle age, with the middle portion sometimes distinctly projecting beyond the level of the margin. When, finally, the fish approaches the mature state, the upper and lower lobes are produced, and the fin becomes subcrescentic or really forked. Even in this state, I have observed specimens in which the middle part of the fin is slightly produced, so that it has the appearance of having three lobes. Rüppell * has also observed slighter changes in the form of the caudal.

The following species have been founded on such variations: *Echeneis lunata* by Bancroft †, *Echeneis vittata* by Lowe ‡, a second *Echeneis vittata* by Rüppell §, and finally, *Echeneis australis* by Griffith ||.

The authors who remain to be mentioned have not contributed

* Neue Wirbelth. Fische, p. 82.

† Proceed. Comm. Zool. Soc. i. p. 134, and Zool. Journ. v. p. 411, pl. 18 (indifferent description and figure).

‡ Proc. Zool. Soc. 1839, p. 89; and Fishes of Madeira, p. 77. tab. 11.

§ N. W. Fische, p. 82.

|| Anim. Kingd. Pisc. pl. opp. p. 504; Bennett, Whaling Voyage, ii. p. 273.

anything new to the history of the fish; and we know nothing of the mode of its propagation or its development in the earliest stage of life. They state merely its occurrence in the different seas of the temperate and tropical regions. Guichenot * has found it in the Mediterranean, Webb and Berthelot † in the sea of the Canary Islands, Ramon de la Sagra ‡ in the tropical parts of the Atlantic, Cantor § in the Sea of Pinang, Bleeker in almost every part of the East Indian Archipelago, Siebold || in the Japanese Sea.

3. *Echeneis lineata.*

The third species of *Echeneis* was described fifty years after Linnæus, in the year 1791, by two naturalists simultaneously, Menzies ¶ and Euphrasen **. There is at least not the slightest reason for considering them to be different; they are both distinguished by the small number of laminæ in the buckler (10), and by a somewhat slender body. Both descriptions have been taken from apparently immature specimens, the caudal fin being very convex and produced. Menzies, who has the priority, calls the species *E. lineata*; Euphrasen names it *E. tropica.* Schneider †† also gives a figure of the fish, but he erroneously considers Euphrasen's fish to be identical with *E. squalipeta,* Dald. Lacépède ‡‡ and Shaw §§ merely reproduce the account of Menzies.

4. *Echeneis squalipeta.*

The next species which we have to record is *E. squalipeta* of Daldorf |||| ; it has not been recognized again. The specimens on which the species was founded are little more than two inches in length; nevertheless they appear to be adult, having the caudal fin emarginate. The principal character of the species is the continuation of the dorsal and anal fins to the caudal; the buckler has seventeen laminæ. The fishes have been found in the Atlantic between the tropics.

5. *Echeneis osteochir.*

Cuvier ¶¶ has added to the preceding species a fifth, which he

* Guichen. Explor. Algér. Poiss. p. 111 (if this is not *Echeneis Holbrookii*).
† Hist. Nat. Iles Canar., Poiss. p. 87.
‡ Hist. de l'Ile de Cuba, Poiss. p. 170.
§ Catal. Malay. Rept. p. 199.
|| Schleg. Faun. Japon., Poiss. p. 270, pl. 120. f. 1 (var.).
¶ Trans. Linn. Soc. 1791, i. p. 187, tab. 17. f. 1.
** Nya Handl. 1791, xii. p. 317.
†† Bl. Schn. p. 240, tab. 53. f. 1.
‡‡ Hist. Nat. Poiss. iii. pp. 146, 167. §§ Zool. iv. p. 211.
|||| Skrivt. af Naturhist. Selsk. ii. p. 157.
¶¶ Cuv. Règne Anim. and edit. Ill. Poiss. pl. 108. f. 3.

calls *E. osteochir*, from the singularly compressed and ossified rays of the pectoral: it also has not been recognized. It is badly figured in the illustrated edition of the 'Règne Animal,' and appears to have nineteen laminæ in the disk on the head.

6. *Echeneis brachyptera.*

The Rev. R. T. Lowe, who has paid so much attention to the distinction of the species of this genus, discovered a sixth. After having shortly mentioned it in the 'Synopsis of the Fishes of Madeira*,' he fixed its place in the system by the name of *E. brachyptera*, accompanying it with a proper diagnosis†. But it appears to me that the species was long ago seen, and even figured, by Catesby‡. He calls it by the collective name of *Remora*, but expressly enumerates sixteen laminæ in the adhesive disk,—a number also indicated in the figure, which is indifferently executed and posteriorly distorted. Catesby's account is one of the truest found in the older works:—"It can fix itself to any animal or other substance: but the notion that this small fish was able to stop a ship under sail, or a whale in swimming, is entirely fabulous. I have taken five of them from off the body of a shark, which were fixed so fast to different parts of his body that it required great strength to separate them. I have seen them disengaged and swimming very deliberately near the shark's mouth, without his attempting to swallow them, the reason of which I am not able to give."

Like the other species of *Echeneis*, the present is not confined to a district of a certain sea, and was found, nearly at the same time as by Mr. Lowe, by the naturalists attached to the expedition of the French vessel 'La Favorite,' and by Storer. The former have called it *E. sexdecim-laminata*§, and think that their specimen was caught in the Indian Ocean. Storer‖ himself procured a young specimen with only fourteen laminæ in the disk, and named it *E. quatuordecim-laminatus*. As this difference might awaken doubts as to the specific identity of the fishes mentioned, I have carefully compared Storer's description with a Brazilian specimen evidently belonging to *E. brachyptera*, Lowe, and exhibiting fifteen lamellæ in the disk. Both agree very well, excepting a slight difference in the number of the anal rays. Storer states, moreover, that it has four ventral rays, which is evidently a mistake.

Having had the opportunity of comparing Chinese specimens with others from the Atlantic, I do not hesitate to consider the

* Transact. Zool. Soc. ii. p. 191.
† Proceed. Zool. Soc. 1839, p. 89.
‡ Histor. Nat. Carol. ii. p. 26, pl. 26.
§ Eydoux and Gervais, Voy. Favor. Zool. p. 77, pl. 31.
‖ Report Fishes Massach. p. 155.

E. pallida, Schleg.* likewise as synonymous with the present species. I have found sixteen laminæ in Chinese specimens, Schlegel sixteen or seventeen. The latter number appears to indicate the highest limit, as fourteen does the lowest, within which the laminæ vary in this species; they occur only occasionally, and specimens with fifteen and sixteen laminæ are the most frequent.

Finally, a fifth name has been given to this species by Dr. Bleeker,—*E. Nieuhofii*†. He was well aware of its close affinity to the fish described by Lowe and Schlegel; but he considers the diagnosis given by the former as too brief to be taken into consideration, and finds a difference from the fish of the latter in the structure of the skin. The figures given by Nieuhof and Valentyn, which we have mentioned above, are referred to this species by Dr. Bleeker; but if he admits those into the synonymy, the diagnosis of Mr. Lowe, with the name proposed by him, would have merited it as well. The alleged difference in the structure of the skin is merely produced by the mode of preservation. Schlegel describes as a peculiarity in the Japanese fish, that its skin has a porous appearance, and that the scales are at the bottom of small cavities. The skin of Bleeker's fish is smooth, although covered with minute scales. I have seen fishes in both states: those with smooth skin are the best preserved, their skin still retaining a part of the mucus. But in specimens preserved for a longer period in somewhat weak spirit, the skin loses all the mucus, and the cavities in which the scales are imbedded make their appearance in the fishes from the Atlantic as well as from the East Indies.

7. *Echeneis albescens.*

This species was made known by Schlegel (Faun. Japon. Poiss. p. 272, pl. 120. fig. 3), and is easily recognized by the small number of laminæ in the disk (thirteen). I have found it since in a collection of Chinese fishes, and another form closely allied to it.

8. *Echeneis Holbrookii.*

I cannot claim the discovery of this species, as it has apparently been known to several of the North American writers (although they have confounded it with *E. naucrates*), and it is evident that it has been described by Holbrook. The latter, however, does not point out those characters by which it may be distinguished at once from the other species mentioned, and calls it *E. lineata,* which name had been applied long before to a different species.

* Faun. Japon. Poiss. p. 271, pl. 120. figs. 2, 3.

† Bleek., Natuurk. Tydschr. Nederl. Ind. 1853, i. p. 279.

We have seen above, that the fish named by Mitchill *E. albicauda* is in fact merely an immature specimen of *E. naucrates*; consequently this name is a synonym of that species, and cannot be applied to a second, discovered at a later period. Dekay* assigns this name to the larger species of Sucking-fish found on the coast of the United States. Most of the specimens which he professes to have examined belong evidently to *E. naucrates*; but, as he mentions also fishes with twenty-one laminæ, it is possible that he has confounded that species and *E. Holbrookii*. Guichenot† appears to have fallen into the same error: he describes a single specimen with twenty-one laminæ, caught on the coast of Algiers, as *E. naucrates*. As this species, however, also shows exceptionally a number of laminæ which is constant in the other, the question can be decided only by an autoptical examination of that individual. Holbrook was the first who described our eighth *Echeneis* as a separate species ‡. Although he does not appear to have been aware of its close affinity with *E. naucrates*, he very properly places it at the side of *Elacate*; he is, besides, decidedly of opinion that the firm adhesion of the disk to another object is effected by a vacuum produced in consequence of the erection of the laminæ.

9. *Echeneis scutata.*

(Pl. X. B.)

This is a new and most remarkable species, distinguished by the extraordinary size of the disk. Its diagnosis is as follows:

D. 27 | 22. A. 21–23.

The length of the disk is contained $2\frac{1}{3}$ times in the total length; the width of the body between the pectorals $5\frac{3}{5}$ times. Caudal truncated. Dorsal and anal fins not continued to the caudal. Colour brown.

Twenty inches long.

From the Indian Ocean (Ceylon).

10. *Echeneis clypeata.*

D. 12 | 17. A. 20.

The length of the disk is contained $3\frac{1}{7}$ times in the total, the width of the body between the pectorals 5 times. Caudal subtruncated. The lower jaw and the vomer anteriorly with a series of widely-set and strong teeth. The angle of the mouth is situated in the vertical line from the second lamina of the adhesive disk. The length of the ventral is much less than the distance between the

* New York Fauna: Fishes, p. 307.

† Explorat. Algér. Poiss. p. 111.

‡ Ichthyol. South. Carol. p. 101. pl. 14. f. 2.

root of the pectoral and the posterior margin of the eye. Uniform brown.

This is another new species from the Cape Seas, closely allied to *E. albescens*, from which it differs by its narrower mouth, its shorter ventral fin, and also by the smaller number of the laminæ of the disk. To which of the two species the figure given by Dampier (Voyage to New Holland, i. pl. 1. fig. 6) ought to be referred is a question that cannot be decided.

In conclusion, I give a synoptical review of the species enumerated*:—

a. Species with a stout and rather short body.

	No. of laminæ.
1. *E. clypeata*, Gthr.	12
2. *E. albescens*, Schleg.	13
3. *E. squalipeta*, Daldorf	17
4. *E. brachyptera*, Lowe	15–16
5. *E. remora*, L.	17–18
6. *E. osteochir*, Cuv.	19
7. *E. scutata*, Gthr.	27

β. Species with a slender body.

8. *E. lineata*, Menzies	10
9. *E. Holbrookii*, Gthr.	21
10. *E. naucrates*, L.	22–25

XLIII.—*Note concerning* Statice Dodartii *and* S. occidentalis.

By C. C. Babington.

In the year 1849 I published a paper in these 'Annals' (ser. 2. iii. 433) "On the British Plumbaginaceæ," pointing out that the plant erroneously called *S. spathulata* or *S. cordata* in this country is the *S. occidentalis* (Lloyd). I also endeavoured to show that the *S. Dodartii* (Gir.) inhabited our western coasts. At that time, and until very recently, I had not seen an au-

* While this paper was passing through the press, my attention was called to the announcement of one on the same subject by M. Duméril (Compt. Rend. 1858, p. 374), in which he enumerates *forty-six species* which are to be described by him. He does not appear to be aware of the variability of the number of the laminæ and fin-rays, nor of the variation of the form of the caudal fin. He states that he has examined 161 specimens,—a number scarcely exceeding that examined by myself, the British Museum alone possessing 130 specimens. The difference in the treatment of the subject, therefore, is so great, that there is no reason to hold back this paper on account of that advertisement,—the less as, perhaps, M. Duméril may obtain from it some information that may prove useful to him.